IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES
(Attorney Docket No. 15625US02)

In the Application of:

Min Chuin Hoo, et al.

Serial No. 10/810,408

Filed: March 26, 2004

For: METHOD AND SYSTEM FOR ANTENNA SELECTION DIVERSITY WITH MINIMUM THRESHOLD

Examiner: Jaison Joseph

Group Art Unit: 2611

Confirmation No. 8918

Electronically Filed on July 26, 2010

REPLY BRIEF

MS: APPEAL BRIEF-PATENTS
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with 37 CFR 41.41, the Appellant submits this Reply Brief in response to the Examiner's Answer mailed on May 25, 2010. Claims 1-46 are pending in the present Application. The Appellant has responded to the Examiner in the Examiner's Answer, as found in the following section.

REMARKS

As an initial matter, the Appellant notes that the arguments set forth in the Examiner's Answer are essentially the exact same as those set forth in the Final Office Action. (Compare Examiner's Answer, pp. 4-12 with Final Office Action, pp. 4-12.) Accordingly, the Appeal Brief addresses these arguments. (*See* Appeal Brief, pp.8-26.) The Appellant will now address certain points raised by the Examiner's Answer.

I. WAGNER DOES NOT ANTICIPATE CLAIMS 1, 3, 5-7, 15, 17, 19-23, 28, 31-32, 34, 36-40, 42 AND 44-46

A. Independent Claims 1, 15, 31, 32, and 39

The Examiner responds to Appellant's arguments regarding the independent claims as follows:

> With respect to claims 1, 15, 31, 32, and 39, Applicant group claims 1, 15, 31, 32, and 39 together and limit the argument on claim 1 only. In particular, Applicant argues that "...Wagner does not disclose or suggest at least the limitation of "determining a signal quality metric for a plurality of signal paths, wherein one or more of said plurality of signal paths is selected based on stored information related to preceding frames, the stored information received via each of the plurality of signal paths, " as recited by the Appellant in independent claim 1."
>
> Response -- However the Office respectfully disagrees. The Office submits that Wagner teaches "evaluating each of the plurality of signal sources (paths) based upon reception of test data to provide a plurality of quality metrics" (see column 18 lines 6 - 8). This is equivalent to the limitation "determining a signal quality metric for a plurality of signal paths". Wagner further teaches "selecting a payload signal source (signal path) based on the plurality of quality metrics" (see column 18, lines 9). Wagner further teaches "selecting the payload signal source based at least upon a previous quality metric corresponding to a previous payload signal source" (see column 18, lines 17 - 19). Wagner further teach "quality metric, Q(T), of the test antenna is updated and stored" (see column 7, lines 39 - 40). Further Wagner

> teaches that each antennas (signal paths) are tested and the quality metric Q(T) is stored for each of the signal paths (see column 7, lines 39 - 46 and column 14, lines 43 - 44) . Therefore Wagner clearly teach the limitations of "one or more of said plurality of signal paths is selected based on stored information related to preceding frames". Therefore Wagner clearly teaches above mentioned limitations. Therefore claims 1, 15, 31, 32, and 39 remains stand rejected.

(Answer, p. 12-13.) The above response repeats many of the same arguments as the Final Office Action. (*See* Final Office Action, p. 2.) These arguments are fully addressed in the Appeal Brief at pages 11-12. The Examiner goes on to state as follows:

> Applicant further argues, "Wagner's antenna selection is based only on a current quality metric value for the specific antenna, and it is not based on stored information related to preceding frames, where the stored information is received via each of the plurality of signal paths." However the Office respectfully disagrees. Wagner clearly teaches "selecting the payload signal source based at least upon a previous quality metric corresponding to a previous payload signal source" (see column 18, lines 17 - 19). Wagner further teach "quality metric, Q(T), of the test antenna is updated and stored" (see column 7, lines 39 - 40). Further Wagner teaches that each antennas (signal paths) are tested and the quality metric Q(T) is stored for each of the signal paths (see column 7, lines 39 - 46 and column 14, lines 43 - 44). Therefore Wagner clearly teach the limitations of "one or more of said plurality of signal paths is selected based on stored information related to preceding frames". Therefore Wagner clearly teaches above mentioned limitations.

(Answer, p. 13-14.) In the above-quoted passage of the Answer, the Examiner alleges that "Wagner further teaches 'selecting the payload signal source based at least upon a previous quality metric corresponding to a previous payload signal source' (*see* column 18, lines 17 - 19)." In context, the cited passage of Wagner actually reads as follows:

> 19. The method of claim 18, wherein the step of selecting further comprises selecting the payload signal source based at least upon a previous quality metric corresponding to a previous payload signal source **comparing unfavorably with a threshold**.

(Wagner, 18:16-20.) In other words, this passage is directed to selecting a new payload source signal when the current (previous) payload signal source compares unfavorably with a threshold. It does not disclose or suggest, as the Examiner alleges, that "Wagner's antenna selection is based on stored information related to preceding frames, where the stored information is received via each of the plurality of signal paths." Instead, Wagner's claim 19 appears to be directed to the method illustrated in Figure 4, and in particular steps 406 and 408. Wagner describes these steps as follows:

> At step 406, it is determined whether the quality metric for the payload antenna is currently favorable. . . . This step is preferably included so that a good channel will not be abandoned until its performance degrades to the point that a reliable data output (i.e. substantially error free) can no longer be assured. If Q(P) is currently favorable, the processing continues at step 410 where T is incremented and the process is repeated**. If, however, Q(P) is no longer favorable, processing continues at step 408 where a new antenna P is selected based on all of the current quality metrics. In other words, when performance of the current payload antenna degrades sufficiently, a new payload antenna is selected based on the current state of the quality metrics.** Thereafter, T is incremented so that the process of updating quality metrics may continue. Although the thresholding test of step 406 is preferably implemented, it is understood that step 406 could be eliminated, in which case it is possible that a new payload antenna will be selected for each iteration of test data.

(*Id.*, 6:51-7:6.) In other words, Wagner discloses comparing the quality metric Q(P) for a current payload antenna to a threshold. (*Id.*, Fig. 4, step 406.) If the quality metric

does not compare favorably to the threshold, processing is passed to step 408, where a new antenna P is selected **based on the current quality metric**. (*Id.*, Fig. 4, step 408.)

In the above-quoted passage of the Answer, the Examiner also alleges that "Wagner further teaches 'quality metric, Q(T), of the test antenna is updated and stored' (*see* column 7, lines 39 - 40). Further, Wagner teaches that each antennas (signal paths) are tested and the quality metric Q(T) is stored for each of the signal paths (*see* column 7, lines 39 - 46 and column 14, lines 43 - 44)." (Answer, p. 13.) In context, the passages cited from column 7 read as follows:

> Referring now to FIG. 5, one embodiment of a method for selecting an antenna in accordance with the present invention is illustrated. In particular, the method illustrated in FIG. 5 relies on the use of packetized data transmission in which test data packets are transmitted before each payload packet. The use of packet data systems is well known in the art and need not be described in further detail.
>
> At step 502, the antenna currently selected to receive a test packet, Ant(T), is evaluated based on reception of a test packet. In the context of the present invention, this evaluation consist of measuring and/or calculating the values of various receive parameters based on the received test data, presently preferred examples of which are described in greater detail below. Preferably, the parameters measured/calculated at step 502 comprise a first set of parameters. **Using the first set of parameters, the quality metric, Q(T), of the test antenna is updated and stored at step 504. Thereafter, at step 506, T is incremented in anticipation of the next test packet. Because the identity of the test antenna is continuously incremented, the present invention causes quality metrics to be continuously updated, thereby providing greater reliability when using the quality metrics to select an antenna**.
>
> At step 508, it is determined whether the quality metric, Q(P), of the current payload antenna is favorable or not, as described above relative to step 406. If not, a new payload antenna P is selected at step 512 based on all of the current

> quality metric values. The selection of a new antenna may then be manifested through the issuance of a control signal used to control an antenna switch. In a preferred embodiment, the quality metrics values may vary within a fixed range, for example, from 0 to 1023 where a value of 0 represents the best possible (most favorable) quality metric and a value of 1023 represents the worst possible (least favorable) quality metric. Thus, as shown in FIG. 5, P is set to the value of j based on finding the minimum quality metric Q(j) for j=1 to N.

(Wagner, 7:24-61, where lines 39-46 are indicated in bold.) Read in context, it is clear that passage cited by the Examiner does not disclose or suggest "determining a signal quality metric for a plurality of signal paths, wherein one or more of said plurality of signal paths is selected based on stored information related to preceding frames, the stored information received via each of the plurality of signal paths." Rather, with reference to Figure 5, the above-quoted passage of Wagner indicates that quality metrics Q are being **continuously** determined and assessed for the different receiving antennas. Wagner does not utilize any stored information relating to preceding frames. In fact, Wagner makes a continuous determination of the quality metrics using currently received test and payload data, and does not even utilize any information relating to previously received or preceding frames.

The Examiner also cites to column 14, lines 43 – 44 of Wagner as allegedly teaching "that each antennas (signal paths) are tested and the quality metric Q(T) is stored for each of the signal paths." (Answer, p. 13.) In context, this passage of Wagner reads as follows:

> **At step 634, it is determined whether all antennas have been tested. Stated another way, it is determined whether all of the test packets 712 have been received**. If not, the test index T is incremented at step 636 so that the next test packet will be used to test another antenna. Note

> that step 634 could be implemented at other points within the sequence of steps shown in FIG. 6 as a matter of design choice.

(*See* Wagner, 43-59, where lines 43-44 are indicated in bold.) The cited passage merely discloses determining whether all antennas have been tested. It does not disclose or suggest "determining a signal quality metric for a plurality of signal paths, wherein one or more of said plurality of signal paths is selected based on stored information related to preceding frames, the stored information received via each of the plurality of signal paths."

Accordingly, for at least the above reasons and the reasons set forth in the Appeal Brief, Wagner fails to disclose or suggest "determining a signal quality metric for a plurality of signal paths, wherein one or more of said plurality of signal paths is selected based on stored information related to preceding frames, the stored information received via each of the plurality of signal paths," as recited by the Appellant in independent claims 1, 15, 31, 32, and 39. Therefore, claims 1, 15, 31, 32, and 39 are patentable and the Appellant requests that the Board withdraw the rejection of these claims as being anticipated by Wagner.

B. Claims 3, 17, 34, and 42

Claims 3, 17, 34, and 42 are patentable at least for the reasons set forth in the Appellant's Appeal Brief.

C. Claims 5, 19, 36 and 44

Claims 5, 19, 36 and 44 are patentable at least for the reasons set forth in the Appellant's Appeal Brief.

D. Claims 6, 20, 37 and 45

Claims 6, 20, 37 and 45 are patentable at least for the reasons set forth in the Appellant's Appeal Brief.

E. Claims 7, 21, 38 and 46

Claims 7, 21, 38 and 46 are patentable at least for the reasons set forth in the Appellant's Appeal Brief

F. Claims 22 and 28

The Examiner responds to Appellant's arguments regarding dependent claims 22 and 28 as follows:

> Response - With respect claims 22 and 28, the Applicant makes same argument as the argument applied to claim 1. Therefore the same response applied to the argument with respect to claim 1 above is applied here. The Office further submits that Wagner clearly teaches "selecting the payload signal source based at least upon a previous quality metric corresponding to a previous payload signal source" (see column 18, lines 17 - 19). Wagner further teach "quality metric, Q(T), of the test antenna is updated and stored" (see column 7, lines 39 - 40). Further Wagner teaches that each antennas (signal paths) are tested and the quality metric Q(T) is stored for each of the signal paths (see column 7, lines 39 - 46 and column 14, lines 43 - 44) . Therefore Wagner clearly teaches above mentioned limitations. Therefore claims 22 and 28 remain stand rejected.

(Answer, pp. 16-17.) The Appellant respectfully disagrees. In rejecting these claims, the Examiner relies on the same passages of Wagner that he used in rejecting independent claims 1, 15, 31, 32 and 39. Thus, the Appellant submits that the Examiner's interpretation of these passages is incorrect for at least the same reasons as set forth above in connection with the independent claims. In this regard, the cited passages, when considered in context, fail to disclose or suggest "selecting a first of

said plurality of signal paths based on said previously stored information relating to preceding frames." Instead, the cited passages merely disclose antenna selection based on current quality matrices, which are continuously updated.

Accordingly, claims 22 and 28 are patentable at least for these reasons and the reasons set forth in the Appeal Brief.

II. THE PROPOSED COMBINATION OF WAGNER AND TANAKA DOES NOT RENDER CLAIMS 2, 4, 16, 18, 33, 35, 39, 41 AND 43 UNPATENTABLE

A. Claims 2, 16, 33 and 41

The Examiner responds to Appellant's arguments regarding dependent claims 2, 16, 33 and 41 as follows:

> Response -- With respect claim 2, 16, 33, and 41, the Applicant makes same argument as the argument applied to claim 1. Therefore the same response applied to the argument with respect to claim 1 above is applied here. The office further submits that Tanaka teaches having threshold value that is variable (see column 5, lines 30). Therefore it would have been to Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to incorporate the teaching of applying different threshold in Wagner. Therefore Wagner in view of Tanaka teaches all the cited limitations. Therefore claims 2, 16, 33, and 41 remain stand rejected.

(Answer, p. 18.) The Appellant respectfully disagrees. As explained in the Appeal Brief, Tanaka selects one of antennas 2a and 2b every time the guard bit section in each frame is received (*see* Tanaka at col. 2, lines 55-56). Antenna selection in Tanaka is not based on stored information related to preceding frames. Furthermore, Tanaka (including column 5, line 30) does not disclose assigning a threshold signal quality metric for a plurality of signal paths, by virtue of the fact that either antenna 2a or antenna 2b is selected for processing (i.e., there is no determination of a quality metric

with regard to a plurality of antennas or signal paths). Accordingly, the Appellant submits that claims 2, 16, 33 and 41 are allowable over the references cited in the Final Office Action at least for the above reasons.

B. Claims 4, 18, 35 and 43

The Examiner responds to Appellant's arguments regarding dependent claims 4, 18, 35 and 43 as follows:

> Response -- With respect claims 4, 18, 35, and 43, the Applicant makes same argument as the argument applied to claim 1. Therefore the same response applied to the argument with respect to claim 1 above is applied here. The office further submits that Tanaka teaches having threshold value that is variable (see column 5, lines 30). Therefore it would have been to [sic] Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to incorporate the teaching of applying different threshold in Wagner. Therefore Wagner in view of Tanaka teaches all the cited limitations. Therefore claims 4, 18, 35, and 43 remain stand rejected.

(Answer, pp. 18-19.) The Appellant disagrees. Tanaka selects one of antennas 2a and 2b using a switch (*see* abstract of Tanaka). Switching between the antennas is performed **every time the guard bit section in each frame is received** (*see* Tanaka at col. 2, lines 55-56). In this regard, selection of the antennas is **not based on stored information related to preceding frames**. Furthermore, Tanaka (including column 5, line 30) does not disclose any dynamic changing of a threshold signal quality metric for a plurality of signal paths, by virtue of the fact that either antenna 2a or antenna 2b is selected for processing (i.e., there is no determination of a quality metric with regard to a plurality of antennas or signal paths, e.g., for both antennas 2a and 2b). Accordingly, the Appellant submits that claims 4, 18, 35 and 43 are allowable over the references cited in the Final Office Action at least for the above reasons.

III. THE PROPOSED COMBINATION OF WAGNER AND MANTHA DOES NOT RENDER CLAIMS 23 AND 29 UNPATENTABLE

The Examiner responds to Appellant's arguments regarding dependent claims 23 and 29 as follows:

> Response - With respect claims 23 and 29, the Applicant makes same argument as the argument applied to claim 1 (Applicant group claims 1, 15, 31, 32, and 39 together and limit the argument on claim 1 only). Therefore the same response applied to the argument with respect to claim 1 above is applied here. The Office further submits that Mantha et al teach the method further comprising selecting one or more of said plurality of signal paths based on a history of previously selected signal paths (see page 7 right hand column, lines 8 - 12). Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to incorporate the teaching of selecting signal path based on the history. Therefore Wagner in view of Mantha et al teaches all the cited limitations. Therefore claims 23 and 29 remain stand rejected.

(Answer, p. 19.) The Appellant disagrees. The Examiner relies on claim 30 of Mantha as allegedly disclosing "selecting one or more of said plurality of signal paths based on a history of previously selected signal paths." Claim 30 of Mantha discloses that selection of an alternative antenna configuration is made based upon a history of reception qualities achieved from each of the possible antenna configurations. Mantha, however, does not disclose selecting a signal path based on a history of previously selected signal paths. In this regard, Mantha performs antenna selection only based on a history of reception qualities, but not on a history of which signal paths were selected. Accordingly, the Appellant submits that claims 23 and 29 are allowable over the references cited in the Final Office Action at least for the above reasons.

IV. THE COMBINATION OF WAGNER AND KOERNER DOES NOT RENDER CLAIMS 8, 10, 12-14 AND 25 UNPATENTABLE

Claims 8, 10, 12-14 and 25 are patentable at least for the reasons set forth in the Appellant's Appeal Brief.

V. THE PROPOSED COMBINATION OF WAGNER, TANAKA AND KOERNER DOES NOT RENDER CLAIMS 9 AND 11 UNPATENTABLE

The Examiner responds to Appellant's arguments regarding dependent claims 9 and 11 as follows:

> Response -- With respect claims 9 and 11, the Applicant makes same argument as the argument applied to claim 1. Therefore the same response applied to the argument with respect to claim 1 above is applied here. The office further submits that Tanaka teaches having threshold value that is variable (see column 5, lines 30). Therefore it would have been to [sic] Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to incorporate the teaching of applying different threshold in Wagner. Therefore Wagner in view of Tanaka and Keorner [sic] teaches all the cited limitations. Therefore claims 9 and 11 remain stand rejected.

(Answer, pp. 20-21.) The Appellant disagrees. The Appellant again points out that Tanaka selects one of antennas 2a and 2b using a switch (*see* abstract of Tanaka). Switching between the antennas is performed every time the guard bit section in each frame is received (*see* Tanaka at col. 2, lines 55-56). In this regard, selection of the antennas is not based on stored information related to preceding frames. Furthermore, Tanaka (column 5, line 30) does not disclose any assigning of a threshold signal quality metric for a plurality of signal paths, by virtue of the fact that either antenna 2a or antenna 2b is selected for processing. There is no determination of a quality metric with regard to a plurality of antennas or signal paths. There also is not a determination of a quality metric with regard to a plurality of antennas or signal paths, e.g., for both

antennas 2a and 2b. Accordingly, the Appellant submits that claims 9 and 11 are allowable over the references cited in the Final Office Action at least for the above reasons.

VI. THE PROPOSED COMBINATION OF WAGNER, MANTHA AND KOERNER DOES NOT RENDER CLAIM 26 UNPATENTABLE

The Examiner responds to Appellant's arguments regarding dependent claim 26 as follows:

> Response - However the office respectfully disagrees. The Office further submits that Mantha et al teach the method further comprising selecting one or more of said plurality of signal paths based on a history of previously selected signal paths (see page 7 right hand column, lines 8 - 12). Therefore it would have been obvious to an ordinary skilled in the art at the time the invention was made to incorporate the teaching of selecting signal path based on the history. Therefore Wagner in view of Mantha et al and Koerner teaches all the cited limitations. Therefore claims 23 and 29 remain stand rejected.

(Answer, p. 26.) The Appellant disagrees. The Examiner relies on claim 30 of Mantha as allegedly disclosing "selecting one or more of said plurality of signal paths based on a history of previously selected signal paths." Claim 30 of Mantha discloses that selection of an alternative antenna configuration is made based upon a history of reception qualities achieved from each of the possible antenna configurations. Mantha, however, does not disclose that selecting a signal path is based on a history of previously selected signal paths. In this regard, Mantha performs antenna selection only based on a history of reception qualities, but not on a history of which signal paths were selected. Accordingly, the Appellant submits that claim 26 is allowable over the references cited in the Final Office Action at least for the above reasons.

CONCLUSION

The Appellant submits that the pending claims are allowable in all respects. Reversal of the Examiner's rejections for all the pending claims and issuance of a patent on the Application are therefore requested from the Board.

The Commissioner is hereby authorized to charge additional fee(s) or credit overpayment(s) to the deposit account of McAndrews, Held & Malloy, Ltd., Account No. 13-0017.

Respectfully submitted,

Date: July 26, 2010

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